WHAT IS CLAIMED IS:

1. A method of inducing retrograde transport of an exogenous compound in an axon, the method comprising:

(a) increasing in the axon an activity and/or a level of a molecule participating in importin mediated retrograde transport; and

(b) administering the exogenous compound to the axon, the exogenous compound being capable of directly or indirectly associating with said molecule participating in importin mediated retrograde transport, thereby inducing retrograde transport of the exogenous compound in the axon.

2. The method of claim 1, wherein step (b) is effected prior to, concomitantly with, or following step (a).

3. The method of claim 1, wherein said increasing in the axon said activity and/or said level of said molecule participating in importin mediated retrograde transport is effected by administering to the axon at least one agent selected from the group consisting of:

(i) an exogenous polynucleotide sequence designed and constructed to express at least a functional portion of said molecule participating in importin mediated retrograde transport;

(ii) a molecule capable of activating said molecule participating in importin mediated retrograde transport; and

(iii) at least a functional portion of said molecule participating in importin mediated retrograde transport.

4. The method of claim 1, wherein said molecule participating in importin mediated retrograde transport is selected from the group consisting of an importin, an intermediate filament protein, a molecule including a nuclear localization signal, and an ERK.

5. The method of claim 4, wherein said importin is importin-beta,

transportin or importin-alpha.

6. The method of claim 5, wherein said importin-beta is importin-beta1.

7. The method of claim 5, wherein said importin-alpha is importin-alpha4.

8. The method of claim 4, wherein said intermediate filament protein is a type III intermediate filament protein.

9. The method of claim 8, wherein said type III intermediate filament protein is vimentin or peripherin.

10. The method of claim 4, wherein said nuclear localization signal includes an amino acid sequence set forth in SEQ ID NO: 2 or 5.

11. The method of claim 4, wherein said ERK is selected from the group consisting of ERK1, ERK2 and a phosphorylated ERK.

12. The method of claim 11, wherein said molecule participating in importin mediated retrograde transport is said phosphorylated ERK, and whereas the method further comprises the step of modulating in the axon a level of calcium.

13. The method of claim 1, wherein said molecule participating in importin mediated retrograde transport participates in importin-beta mediated retrograde transport, transportin mediated retrograde transport or importin-alpha mediated retrograde transport.

14. The method of claim 13, wherein said molecule participating in importin-beta mediated retrograde transport participates in importin-beta1 mediated retrograde transport.

15. The method of claim 13, wherein said molecule participating in

importin-alpha mediated retrograde transport participates in importin-alpha4 mediated retrograde transport.

16. The method of claim 1, wherein the axon is an injured axon.

17. A method of modulating growth of an axon, the method comprising regulating importin mediated retrograde transport in the axon thereby modulating growth of the axon.

18. The method of claim 17, wherein said regulating importin mediated retrograde transport in the axon is effected by altering in the axon an activity and/or a level of a molecule participating in importin mediated retrograde transport.

19. The method of claim 18, wherein said regulating importin mediated retrograde transport in the axon is up-regulating importin mediated retrograde transport in the axon, and whereas said up-regulating importin mediated retrograde transport in the axon is effected by increasing in the axon said activity and/or said level of said molecule participating in importin mediated retrograde transport.

20. The method of claim 19, wherein said increasing in the axon said activity and/or said level of said molecule participating in importin mediated retrograde transport is effected by administering to the axon at least one agent selected from the group consisting of:

(i) an exogenous polynucleotide sequence designed and constructed to express at least a functional portion of said molecule participating in importin mediated retrograde transport;

(ii) a molecule capable of activating said molecule participating in importin mediated retrograde transport; and

(iii) at least a functional portion said molecule participating in importin mediated retrograde transport.

21. The method of claim 18, wherein said regulating importin mediated retrograde transport in the axon is down-regulating importin mediated retrograde

transport in the axon, and whereas said down-regulating importin mediated retrograde transport in the axon is effected by decreasing in the axon said activity and/or said level of said molecule participating in importin mediated retrograde transport.

22. The method of claim 21, wherein said decreasing in the axon said activity and/or said level of said molecule participating in importin mediated retrograde transport is effected by administering to the axon at least one agent selected from the group consisting of:

(a) a molecule capable of binding said molecule participating in importin mediated retrograde transport;

(b) an siRNA molecule capable of inducing degradation of an RNA encoding said molecule participating in importin mediated retrograde transport;

(c) an antisense polynucleotide capable of hybridizing with an mRNA encoding said molecule participating in importin mediated retrograde transport;

(d) a ribozyme capable of cleaving an mRNA encoding said molecule participating in importin mediated retrograde transport; and

(e) a molecule capable of inhibiting ligand-binding of said molecule participating in importin mediated retrograde transport.

23. The method of claim 18, wherein said molecule participating in importin mediated retrograde transport is selected from the group consisting of an importin, an intermediate filament protein, a molecule including a nuclear localization signal, and an ERK.

24. The method of claim 23, wherein said importin is importin-alpha, transportin or importin-beta.

25. The method of claim 24, wherein said importin-beta is importin-beta1.

26. The method of claim 24, wherein said importin-alpha is importin-alpha4.

27. The method of claim 23, wherein said intermediate filament protein is a type III intermediate filament protein.

28. The method of claim 27, wherein said type III intermediate filament protein is vimentin or peripherin.

29. The method of claim 23, wherein said nuclear localization signal includes an amino acid sequence set forth in SEQ ID NO: 2 or 5.

30. The method of claim 23, wherein said ERK is selected from the group consisting of ERK1, ERK2 and a phosphorylated ERK.

31. The method of claim 30, wherein said molecule participating in importin mediated retrograde transport is said phosphorylated ERK, and whereas the method further comprises the step of modulating in the axon a level of calcium.

32. The method of claim 17, wherein said molecule participating in importin mediated retrograde transport participates in importin-beta mediated retrograde transport, transportin mediated retrograde transport or importin-alpha mediated retrograde transport.

33. The method of claim 32, wherein said molecule participating in importin-beta mediated retrograde transport participates in importin-beta1 mediated retrograde transport.

34. The method of claim 32, wherein said molecule participating in importin-alpha mediated retrograde transport participates in importin-alpha4 mediated retrograde transport.

35. The method of claim 17, wherein the axon is an injured axon.

36. A composition-of-matter comprising a compound associated with a molecule participating in importin mediated retrograde transport in an axon, wherein

said compound is capable of regulating in a cell a physiological process selected from the group consisting of growth, retrograde transport, survival, and differentiation.

37. The composition-of-matter of claim 36, wherein said molecule participating in importin mediated retrograde transport is selected from the group consisting of an importin, an intermediate filament protein, a molecule including a nuclear localization signal, and an ERK.

38. The composition-of-matter of claim 37, wherein said importin is importin-alpha, transportin or importin-beta.

39. The composition-of-matter of claim 38, wherein said importin-beta is importin-beta1.

40. The composition-of-matter of claim 38, wherein said importin-alpha is importin-alpha4.

41. The composition-of-matter of claim 37, wherein said intermediate filament protein is a type III intermediate filament protein.

42. The composition-of-matter of claim 41, wherein said type III intermediate filament protein is vimentin or peripherin.

43. The composition-of-matter of claim 37, wherein said nuclear localization signal includes an amino acid sequence set forth in SEQ ID NO: 2 or 5.

44. The composition-of-matter of claim 37, wherein said ERK is selected from the group consisting of ERK1, ERK2 and a phosphorylated ERK.

45. The composition-of-matter of claim 44, wherein said molecule participating in importin mediated retrograde transport is said phosphorylated ERK, and whereas the composition-of-matter further comprises calcium.

46. The composition-of-matter of claim 36, wherein said compound is selected from the group consisting of an importin, an intermediate filament protein, a molecule including a nuclear localization signal, and an ERK.

47. The composition-of-matter of claim 46, wherein said importin is importin-alpha, transportin or importin-beta.

48. The composition-of-matter of claim 47, wherein said importin-beta is importin-beta1.

49. The composition-of-matter of claim 47, wherein said importin-alpha is importin-alpha4.

50. The composition-of-matter of claim 46, wherein said intermediate filament protein is a type III intermediate filament protein.

51. The composition-of-matter of claim 50, wherein said type III intermediate filament protein is vimentin or peripherin.

52. The composition-of-matter of claim 46, wherein said nuclear localization signal includes an amino acid sequence set forth in SEQ ID NO: 2 or 5.

53. The composition-of-matter of claim 46, wherein said ERK is selected from the group consisting of ERK1, ERK2 and a phosphorylated ERK.

54. The composition-of-matter of claim 53, wherein said compound is said phosphorylated ERK, and whereas the composition-of-matter further comprises calcium.

55. The composition-of-matter of claim 36, wherein said molecule participating in importin mediated retrograde transport participates in importin-beta mediated retrograde transport, transportin mediated retrograde transport or importin-alpha mediated retrograde transport.

56. The composition-of-matter of claim 55, wherein said molecule participating in importin-beta mediated retrograde transport participates in importin-beta1 mediated retrograde transport.

57. The composition-of-matter of claim 55, wherein said molecule participating in importin-alpha mediated retrograde transport participates in importin-alpha4 mediated retrograde transport.

58. The method of claim 36, wherein said axon is an injured axon.

59. The method of claim 36, wherein said cell is a neuron or a neuron-associated cell.

60. The method of claim 59, wherein said neuron is an injured neuron.

61. A polynucleotide encoding a chimeric polypeptide comprising at least a portion of a molecule participating in importin mediated retrograde transport in an axon, said at least a portion of a molecule participating in importin mediated retrograde transport being fused to an amino acid sequence capable of regulating in a cell a physiological process selected from the group consisting of growth, retrograde transport, survival, and differentiation.

62. The polynucleotide of claim 61, wherein said molecule participating in importin mediated retrograde transport is selected from the group consisting of an importin, an intermediate filament protein, a molecule including a nuclear localization signal, and an ERK.

63. The polynucleotide of claim 62, wherein said importin is importin-alpha, transportin or importin-beta.

64. The polynucleotide of claim 63, wherein said importin-beta is importin-beta1.

65. The polynucleotide of claim 63, wherein said importin-alpha is importin-alpha4.

66. The polynucleotide of claim 62, wherein said intermediate filament protein is a type III intermediate filament protein.

67. The polynucleotide of claim 66, wherein said type III intermediate filament protein is vimentin or peripherin.

68. The polynucleotide of claim 62, wherein said ERK is ERK1 or ERK2.

69. The polynucleotide of claim 62, wherein said nuclear localization signal includes an amino acid sequence set forth in SEQ ID NO: 2 or 5.

70. The polynucleotide of claim 61, wherein said molecule participating in importin mediated retrograde transport participates in importin-beta mediated retrograde transport, transportin mediated retrograde transport or importin-alpha mediated retrograde transport.

71. The polynucleotide of claim 70, wherein said molecule participating in importin-beta mediated retrograde transport participates in importin-beta1 mediated retrograde transport.

72. The polynucleotide of claim 70, wherein said molecule participating in importin-alpha mediated retrograde transport participates in importin-alpha4 mediated retrograde transport.

73. The method of claim 61, wherein said axon is an injured axon.

74. A nucleic acid construct including the polynucleotide of claim 61.

75. A host cell transformed with the nucleic acid construct of claim 74.

76. The cell of claim 75, wherein the cell is a neuron.